Contribution ID: **26** Type: **Keynote**

Near-field THz nanoscopy with novel accelerator-based photon sources

Tuesday, 10 September 2019 11:10 (30 minutes)

This talk advertises scattering-type scanning near-field infrared nanospectroscopy (s-SNIM) in the spectral range of 75 to 1.2 THz [1,2], as provided by the free-electron laser FELBE at the Helmholtz-Zentrum Dresden-Rossendorf (HZDR), Germany. By combining s-SNIM with FELBE, we demonstrate a ⊠-independent optical resolution of ~10 nm only, by exploring structured Au samples, Graphene-nanotransistors, meta-materials [3,4], and local-scale ferroic phase-transitions [5 - 7] down to LHe temperatures [8]. Moreover, also the non-linear optical responses at IR wavelengths can be explored as recently demonstrated when inspecting highly-doped GaAs/InGaAs core/shell nanowires [9]. Our THz-s-SNIM was also integrated into a THz pump-probe setup for the local analysis of excited states in structured SiGe samples. We developed a sophisticated demodulation technique that extracts pump-induced signals with a superior signal-to-noise ratio [10]. In addition, HZDR recently extended the available wave¬length ranges down to the 100 GHz radiation, employing the novel super-radiant TELBE light source [11,12]. We adapted our s-SNIM to that novel TELBE photon source as well, achieving an equally high spatial resolution as with FELBE. This allows now to bridge the famous THz-gap in order to explore novel quantum phenomena of magnons, spins, and phonon polaritons.
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Summary

Topic

1. Applications and interdisciplinary subjects

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Session Classification: Keynote talk